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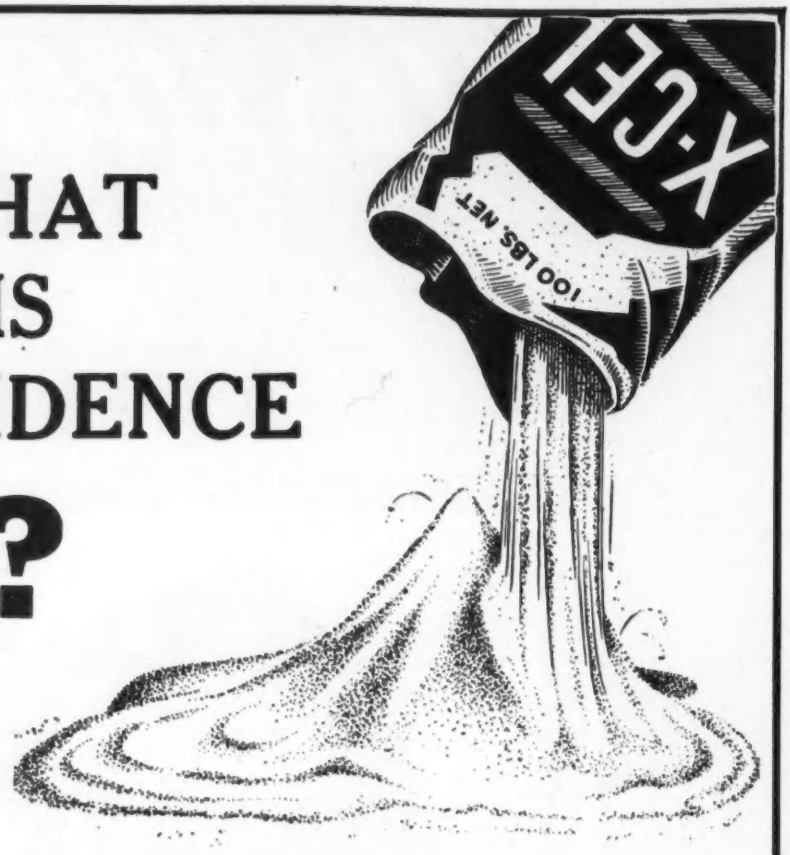

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Some Observations Of The

Control of Citrus Pests by Tree Snails in Lake County

R. E. NORRIS
Lake County Agricultural Agent

The biological control of citrus pests is a fascinating phenomenon to growers and one which because of the economy involved, naturally incites a keen interest among them. Unfortunately though for growers, this method of control has definite limitations which usually fall short of satisfactory insect and disease control without the use of such artificial controls as various sprays and dusts. Biological control factors enter into the overall picture of insect and disease control even when artificial control measures are used as is evidenced by the presence of various entomogenous fungi and other parasites and predators in groves regularly receiving full spray and dust programs. Then there are those notorious groves located here and there, few in number, that are in excellent condition and produce good crops and depend entirely on natural control of insect and disease pets.

In Lake County there are several hundreds of acres of groves on which a very minimum of artificial control of insect and disease pests is carried out. Several of these groves are inhabited by tree snails (Drymaeus dormani, Binney) which give quite excellent control of scale, whitefly, and sooty mold. Their effectiveness varies considerably with a number of factors. Without attempting to leave the impression that we consider ourselves experts, or even close observers, we would like to present a few observations which we hope will do no more than create sufficient interest to warrant a full scale study by qualified persons into the possibilities of this animal as a valuable ally to the citrus grower wherever it is adapted.

Drymaeus dormani (hereinafter referred to as the snail) has been known in Florida for many years. It was first described by a Major Dorman, a Civil War officer near Saint Augustine shortly after the close of that war. It has been more or less generally known by growers in the upper East Coast area and the northern interior area for many years. When E. F. DeBusk was county agent in Lake County from 1921 to 1923 he observed snails in parts of the county but made a particular study of them in the Erck Grove at Sunnywide near Leesburg. When copper sprays came into general use in the state for melanose control the snails were killed out and were all but forgotten in those groves.

Trees inhabited by the snails have the appearance of having just received an oil spray. The fruit and foliage carry a high gloss and the trunk and branches are clean and bright. Fruit from such trees needs only to be sized before it is packed. Snails wash and polish it in a form equal to that of the best machinery and polishes. The fruit has high carrying quality.

We could go into at least 25 groves in Lake County in which a snail population is in evidence. The results of their work could be classified from very effective to very ineffective. But we have made our most careful observations in a

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* Delivered at the 14th Annual Citrus Growers Institute, Camp McQuarrie, August 26, 1947.

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Foot Rot of Citrus in Florida...

Its Habits and Suggestions for Its Control

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Many of the problems of tree health and vigor which formerly troubled the citrus grower are now under satisfactory control. I refer to the nutritional diseases for which suitable corrective measures are now known. Meanwhile, the foot-rot problem remains as serious as ever and is being reported with increasing frequency from areas previously considered safe. In compliance with a request to bring information up to date on the seriousness of this problem, and on methods of control, the following paper is submitted.

Foot rot was first reported in 1834 in the Azore Islands, and in 1861 it was noted in Florida, though remembered by few prior to 1880, according to Swingle and Weber (6). A serious outbreak had occurred in 1879 following a year of very heavy rainfall such as we are experiencing this year 1/. In 1896 Swingle and Weber reported the disease to be widespread in Florida and causing damage at the rate of $100,000 annually. More recently (1945, 1946, and 1947), Dr. R. F. Suit (5) examined 204 declining citrus groves and found foot rot to be the cause of decline in 27 percent, followed by root rot and spreading decline which caused respectively 20 and 13 percent of the cases.

Forty years ago the citrus industry was largely confined to coastal areas and hammock lands. An ideal environment for the foot-rot fungus is provided by such soils, which are predominantly low and poorly drained. Consequently, trees on susceptible rootstocks such as sweet orange and grapefruit were often severely attacked. Sour orange rootstock was found to be highly resistant to the foot-rot fungus and eminently suited to hammock and coastal soils. Moreover, trees budded on it produced fruit of unusually fine quality. The general adoption of sour orange rootstock in such areas practically eliminated the foot-rot problem.

Within comparatively recent years the center of citrus production has shifted to the high dry soils of the central ridge section. This has come about through the use of rough lemon (**C. limonia** hybrid) rootstock. For these new plantings rough lemon was considered to be sufficiently disease-resistant for practical purposes, and early experience encouraged the belief that foot rot would not be a problem on the dry, sandy low-humus, ridge soils. The fallacy of that supposition is being demonstrated, however, as more and more groves approach maturity. Foot rot was not left behind, rather it is being reported with increasing frequency. The purpose of this paper is to call attention to that fact, to the conditions responsible for it, and to discuss suitable control measures.

Since most trees that are affected with diseases of the roots or trunk base exhibit similar symptoms of starvation, foliage symptoms are of little value. The bark symptoms, however, are diagnostic. In the early active stages the bark appears black and water-soaked; often a sour smell can be detected. The area affected may be small or large, depending on the rate of fungus growth. Disease lesions may progress as high as 18 inches above the ground and often are extensive below the soil line and on the roots adjacent to the trunk. Beneath the affected bark the wood shows a brown discoloration, often with yellow margins. During the dry season the diseased bark dries, shrinks, and splits. Frequently the margins of the diseased area break

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1/ Rainfall from January 1 to June 30, 1947, at Orlando, Fla., was 37.8 % above the 40-year average.

What Kind of Quality Do Citrus Canners Want?

RALPH L. MILLER

Manager Research & By-Products Div. Plymouth Citrus Growers Assn., Plymouth, Florida, Condensation of Paper Given At Meeting Florida Citrus Institute, Camp McQuarrie

"Canned orange, grapefruit, or tangerine juice is the undiluted unfermented juice obtained from the properly matured fresh fruit of the orange (Citrus sinensis), grapefruit (Citrus grandis), and tangerine (Citrus reticulata), which fruit has first been properly washed, may be packed with or without the addition of sugar and is sufficiently pasteurized to assure preservation of the product in hermitically sealed containers." The above is the United States Department of Agriculture's description of their requirements for canned citrus juices and is in general what canners and processors are required to produce.

To further describe their requirements, citrus canners must meet the following standards for each kind of juice:

1.

Orange Juice U. S. Grade A U. S. Fancy

Color — Color of fresh juice — Typical — yellow or yellow orange.

Defects — Practically no coagulation of pulp.

Brix — Unsweetened — Not less than 10.5 per cent.

Brix — Sweetened — Not less than 13.5 per cent.

Acid — Not less than 0.75 per cent. Not more than 1.4 per cent.

Recoverable Oil — Not more than 030 — Score 85.

Flavor — Normal — No scorching — Carmelization — Oxidation or Terpene.

Orange Juice Grade C or U. S. Standard

Color — Good color, fairly free from defects — slightly amber little color.

Defects — Not more than slight coagulation of pulp.

Brix — Unsweetened — Not less than 10.0 per cent.

Brix — Sweetened — Not less than 3.5 per cent.

Acid — Not less than 0.65 — Not more than 1.6.

Recoverable Oil — Not more than .050 — Score 70.

Flavor — Good — Slightly carmelized or oxidized.

Grade — Color 20 — Absence of defect 40 — Flavor 40.

Grapefruit U. S. Grade A And Fancy

Color — Not darker than plate 10-G-1.

Defects — Practically free — Suspended — Pulp not more than 10.

Brix — Unsweetened — Not less than 9.5.

Brix — Sweetened — Not less than 13.5.

Acid — Not less than 1.0 per cent. Not more than 2.0 per cent — Some states 1.8 per cent.

Recoverable Oil — Not more than .015.

Flavor — Fine — Grapefruit Score — Not less than 90.

Grapefruit Grade C or U. S. Standard

Color — Slight amber tinge — Not darker than plate 10-J-2.

Defects — Reasonably free — Suspended — Pulp not more than 15 per cent.

Brix — Unsweetened — Not less than 6.5 per cent.

Brix — Sweetened — Not less than 13.5.

Acid — Not less than 0.8 per cent — Not more than 2.0 per cent.

Recoverable Oil — Not more than 0.20 per cent.

Flavor — Normal canned grapefruit juice flavor — Slightly oxidized scorched or terpene. But not objectionable.

Grapefruit and Orange Blend U. S. Grade A and Fancy

Color — Not darker than plate 10-L-6.

Brix — Unsweetened — Not less than 10 per cent.

Brix — Sweetened — Not less than 13.5 per cent.

Acid — Not less than 0.8 per cent. Not more than 1.65 per cent.

Oil — Not more than 030.

Flavor — Fine Distinct Normal typical citrus fruit flavor.

Grapefruit and Orange Blend U. S. Grade C or Standard

Color — Not darker than plate 10-L-7.

Brix — Unsweetened — Not less than 9.5 per cent.

Brix — Sweetened — Not less than 13.5 per cent.

Acid — Not less than 0.7 per cent. Not more than 1.8 per cent.

Flavor — Good Normal Typical Fruit Flavor.

Grade — Color 35, Absence defects 35, Flavor 30.

Tangerine Juice U. S. Grade A or U. S. Fancy

Color — Bright typical tangerine color.

Brix — Unsweetened — Not less than 10.50 per cent.

Brix — Sweetened — Not less than 13.50 per cent.

Acid — Not less than .75. Nor more than 1.4 per cent.

Oil — Not more than .015 per cent.

Flavor — Distinct Normal canned tangerine juice.

Pulp — Not more than 7 per cent.

U. S. Grade C or U. S. Standard

Color — Good typical tangerine color.

Brix — Unsweetened — Not less than 10.0 per cent.

Brix — Sweetened — Not less than 13.50 per cent.

Acid — Not less than .65 nor more than 1.6 per cent.

Oil — Not more than .020 per cent.

Flavor — Good normal canned tangerine juice.

Pulp — Not more than 10 per cent.

Per Cent of Juice In Fruit

By far, the most important consideration to all canners is the yield or number of cans of Grade A or Fancy juice that can be packed out of a box of raw fruit. Most fruit is weighed when received and that containing the highest per cent of juice is most desirable. Extreme large fruit usually yields less juice, while especially small fruit, although comparatively high in juice, slows down the extracting operation.

Dryness may be caused by green fruit, over-ripe fruit or damaged fruit and must be discounted by buyers of fruit for processing.

There is considerable variation in the per cent of juice in some varieties or varieties on some root

stocks, which also affects the yields.

The freshness of citrus fruit or the time it has been off the tree before it is offered to the cannery is also important. The juice yield is lower, the flavor deteriorates and vitamin C is reduced.

External Qualities

Color must be normal for juice from green fruit is most likely to be pale in color, lower in flavor and quality and make an inferior juice. Any dark discoloration of the peel may lower the quality of the juice by causing specks of dark material that contaminate the juice.

Peel texture most desirable is thin and tough. This type of peel resists extractor pressure, holds together well and can be easily extracted without excessive oil. Rough brittle peel that breaks easily extracts poorly and causes excessive amounts of oil in the juice.

Insect and disease damage, although frequently considered unimportant for cannery fruit must be avoided as much as possible. Grade A or Fancy juice is very difficult to make from fruit severely damaged by insects and disease. Scale insects must be removed from the fruit for all juice is examined for scale or other insect fragments and if scale is present on the fruit in the extractors, scale fragments will be found in the juice. Smutty fruit cannot be extracted until it has been thoroughly cleaned for pieces of black smut cause specks in the juice.

Both rust mite and melanose damage on fruit, sufficient enough to discolor peel, lower the vitamin C content and are likely to cause dark specks from the discolored peel in the juice.

In order to remove fruit with severe external damage or discoloration, graders must be kept in the fruit line ahead of the extractors in order to remove undesirable fruit.

Before being extracted, all fruit must be sized in order for it to be extracted properly, so irregular sized or shaped fruit is undesirable. If only one size is fed into the extractors the operation is very slow for one or two of the extractors will have to squeeze all of the juice.

Internal Qualities

The maturity of the fruit is probably the most important internal quality for unmatured fruit is likely to be too acid and too low in solids and will produce a juice with poor color. Although it usually has a high vitamin C content. Over-ripe fruit usually has low acid, may have a low juice content; may have an over-ripe flavor and is usually low in vitamin C content.

The Citric Acid content of the fruit must fall in the ranges given above for the specified grades and if a canner buys fruit in which the acid and solids do not fall into these ranges the fruit cannot be packed as Grade A or Fancy fruit.

The use of too much arsenate spray on grapefruit sometimes lowers the acid so that it is too low for canning Grade A juice. Cultural practices may also cause too little or too much acid.

The brix or per cent of soluble solids may vary, depending on the variety, the root stock, cultural practices or the degree of maturity. Canners always prefer as high Soluble Solids as possible and the buying of fruit on its soluble solids content has been discussed. Any practice that will increase the soluble solids in fruit without interferring with the yield or other qualities is certainly most desirable.

Color of the expressed juice is very important and must be natural for the kind of fruit, neither too pale, too dark, cloudy or muddy.

Oil In The Peel

As mentioned previously, specified amounts of oil are designated as permissable by the USDA for each kind of canned citrus juice. Fruit with brittle peel with high oil content cannot be extracted thoroughly enough without getting excess oil in the juice. For many years, consumers have been in the habit of having small amounts of citrus peel oil in fresh and canned juice so a small amount is necessary. Normal thin skinned tough peeled fruit can be extracted thoroughly and easily without excessive oil.

For sectioninzing grade fruit, the firmness of the flesh is very essential and for this reason seedy grapefruit are necessary.

Although no standard has been set for the vitamin C content of citrus juices, considerable publicity has been given to the fact that they are among the most desirable sources of vitamin C. Since this is the case, citrus processors want fruit with as high vitamin C content as possible to live up to this understanding and canners go to a lot of trouble to retail the vitamin C after the fruit is received.

Summary

As outlined above, canners and processors of citrus fruit want as good quality, bright clean fruit as can be obtained. All of the same characteristics desired in fresh fruit are necessary for cannery fruit, in order to make Grade A or U. S. Fancy juice. When conditions become competitive, premium prices will be paid for the same good qualities in fruit for canneries that are paid for quality in fresh fruit.

Importation of Foreign And Hawaiian Grown Citrus Nursery Stock Is Strictly Prohibited

Protection against the entry of citrus canker and other diseases in nursery stock brought here from foreign countries or shipped to other parts of the United States from Hawaii is provided in two plant quarantine orders to become effective Sept. 15, 1947, Dr. P. N. Annand, Chief of the Bureau of Entomology and Plant Quarantine, announced recently.

Importations of all plants or any plant part, except seeds and fruit, of all botanical genera, species, and varieties of the rutaceous subfamilies Aurantioideae, Rutoideae, and Toddalioideae are prohibited in a revision of foreign quarantine No. 19. Previously this order affected only a limited number of plant species. Inclusion of the three subfamilies extends the regulations to additional plants that have been found susceptible to attack by citrus canker.

A similar prohibition on the movement of the same host material from Hawaii to other sections of the United States is imposed by a new domestic quarantine. Citrus canker is known to be widespread throughout the Hawaiian Islands.

Entry of citrus fruits from infected localities is prohibited by other existing quarantine orders.

Citrus canker was introduced into the United States from the Orient and was first found in this country in 1911 near Houston, Texas. By 1914 it had spread eastward and had become established in many areas along the gulf coast. Control of the disease requires complete destruction of the infected tree. Intensive suppressive programs conducted cooperatively by Federal, state and local agencies resulted in the eradi-

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FOOT ROT OF CITRUS IN FLA.—Its Habits and Suggestions for Its Control

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away from the healthy bark at one or more points and curl back slightly. On low-budded trees on resistant root, lesions may start above the bud line. Foot rot in Florida is caused principally by **Phytophthora parasitica,** a soil-inhabiting, water-loving fungus. **Phytophthora citrophthora,** a related species, and the most frequent cause of foot rot in California, has been found in Florida occassionally.

Foot rot is occasionally confused with the symptoms of gummosis and psorosis, though each has several characteristics that identify it. The causal fungus of gummosis is **Diplodia natalensis,** which lives as a saprophyte on dead twigs and small branches. It attacks citrus fruits causing stem-end rot in storage and also attacks the bark and wood of citrus trees under suitable conditions. Old lesions are usually sooty black in color and usually there is visible some point of entry for the fungus such as a frost-killed twig or a pruning wound. No wound is necessary for infection by the foot-rot fungus. As with foot rot, the gum that is formed in the rainy season is quickly washed away.

Psorosis, on the other hand, is a virus disease which causes the outer layers of the bark to scale off and is sometimes called scaly-dark in California for that reason. The symptoms are almost always found above the bud line if the rootstock is sour orange or rough lemon. Attempts to callus over untreated psorosis lesions are rare, in contrast with foot-rot lesions which usually show some degree of callus formation.

The foot-rot fungus, like other members of this group of fungi, is extremely sensitive to changes in moisture and temperature. It grows most luxuraintly at about 88 degrees F. and ceases growth at temperatures above 97 degrees F. or below 18 degrees F. Temperatures of 122 degrees F. or over are lethal (1). Growth of the fungus strands (mycelia) is of course dependent on adequate moisture, but free water is necessary for the formation and dispersion of the zoospores which swim about like microscopic tadpoles.

The closely related fungus, **Phytophthora citrophthora,** has been found by L. J. Klotz (3) to produce spore sacks (sporangia) within 4 to 5 hours when placed in well-aerated water at 75 degrees F. He found that the free-swimming tadpole-like zoospores were released from the sporangia by a drop in temperature of 20 degrees or more, such as usually occurs during a thundershower. Exposure to 111.9 degrees F. for one minute killed the zoospores but they survived 9 days at temperature of 11.7 degrees below freezing. When grown on alfalfa stems and buried in the field, **P. citrophthora** was not recovered after 12 days where soil temperatures reached 112 degrees F., but was recovered from soil at 104 degrees F. The Florida fungus, **P. parasitica,** probably tolerates slightly higher temperatures. Under favorable conditions zoospores finally come to rest and send out fungus strands or germ tubes which are able to penetrate healthy uninjured bark. During periods of frequent dashing rains the free-swimming spores are often splashed quite high on the tree trunk above the bud union. In the absence of sunlight and drying winds the soil and debris which are splashed up on the trunk serve to hold moisture long enough for the fungus to penetrate into the bark. Under these conditions susceptible varieties such as Dancy tangerine and Pernambuco and Royal grapefruit are afforded little protection by resistant rootstocks.

No extensive test of citrus varieties has been made to determine their relative susceptibility to infection by the Florida foot rot organism **Phytophthora parasitica.** Klotz has determined the susceptibility of over 100 varieties of citrus **to P. citrophthora** (4). In 1946 Gondell (2) in Argentina, reported that on the basis of 25 varieties of citrus tested, susceptibility to **P. citrophthora** and **P. parasitica** is closely parallel but with slightly more gum formation by the latter. Therefore, certain of Klotz's data are presented here in tables 1 and 2 for those not having access to the original paper. Table 1 shows that there are several strains of sour orange, some highly resistant and others less so. All are more resistant than rough lemon. There is one characteristic of rough lemon that indirectly has tended to nullify even its moderate degree of foot-rot resistance and that is its lack of cold hardiness. In order to guard against cold damage to the rootstock and scion it has been customary to place the bud very low to permit protection by banking with soil. As a result of this practice the bud line of mature trees is frequently in contact with the soil and under such conditions the foot-rot resistance of the rootstock affords little or no protection against infection of the scion. It should be pointed out in this connection that there is tremendous opportunity for natural maintenance of the variations in disease resistance and other characteristics, which arise from time to time because of a special feature of reproduction of citrus from seed. The very fact that citrus varieties are usually reproduced true to type from seed, by the apogamic or "false" embroyos, makes for the perpetuation of strains that do deviate from the parent trees, be it disease resistance or other character; and it will be remembered that rootstock varieties are all grown from seed.

With any problem of long standing there are certain time-honored more or less standard control measures. In this instance it is known that commercially satisfactory control can be obtained by the following procedure: (1) dig away the earth from the affected roots, (2) cut away all the diseased tissue plus a small amount of the adjacent healthy tissue, just to be on the safe side, (3) paint the excavated region with a Bordeaux or lime-sulfur paste, and (4) a week later cover the treated region with an asphalt emulsion paint or similar material. Those are good recommendations except that they are rather well described by that phrase heard so often during the war "too little and too late". By the time infection is discovered through the usual haphazard methods of inspection, the tree often is damaged so severely as to preclude recovery through any but drastic treatment and as a result, even though the treatment is effective in stopping the disease, the tree will probably remain a badly crippled specimen for life. Furthermore, treatment of the diseased area affords no protection against later infection of the untreated portions. So the first suggestion in a more modern control program is two-fold: to inspect groves regularly and more or less rigorously as the situation demands, and to spray the root crown and lower trunk once a year preferably before the start of the rainy season, in those areas where foot rot is known to be a problem. It is recog-

nized that very low concentrations of copper are toxic to many species of Phytophthora, hence an application of 30-20-100 Bordeaux mixture should give adequate protection for one season by allowing small amounts of copper to leach out slowly into the bark and adjacent soil. The addition of 3 to 4 gallons of dormant type oil emulsion of 70 percent unsulfonatable residue per 100 gallons of Bordeaux is reported to increase the adhesiveness of Bordeaux and to cause more rapid liberation of soluble copper (7). In our experiments a 1 to 12½ dilution of lime-sulfur solution has given results equal to 20-20-100 Bordeaux mixture. The organic materials tried to date have not given as satisfactory results.

Removal of the soil around the root crown by air-blasting preparatory to control treatments has been tried. Though the method is satisfactory, the present price of $10 per hour for equipment is so high as to preclude its use for any but small-scale experiments. By comparison, high pressure spray guns were found more satisfactory and much cheaper. However, it has not been established that exposing the crown roots in this manner is either essential for foot-rot control or is economically justifiable.

The matter of resistant rootstocks is a question of wide ramifications that is still unsettled. At present, there is no source of tested and accredited rootstocks of uniform disease resistance, rooting habit, drought resistance, etc. Nearly all strains of sour orange are sufficiently resistant to foot rot that their use is indicated where soil conditions permit. Several horticultural varieties of sweet orange such as Golden Buckeye Navel, Indian River, and Jaffa are equally resistant though their suitability from other standpoints is largely unknown. Although citrus production on ridge soils is based on the use of rough lemon rootstock, its mediocre resistance to foot rot seriously diminishes its value. A moderate amount of testing might reveal the existence of highly resistant strains of rough lemon, but to date this has not been done. The high resistance of Cleopatra (mandarin) is a strong point in its favor as a substitute for the rather susceptible rough lemon. The question of choice of rootstocks is one that the grower will have to make himself, but resistance to foot rot should certainly enter into his calculations.

One phase of the rootstock question is the matter of high versus low budding. It is not uncommon to find that Dancy tangerine, Duncan grapefruit, or other susceptible varieties on sour orange or on rough lemon root have been extensively damaged above the bud line by foot rot with relatively little damage to the root. That is not surprising, and only what might be expected where the bud line is close to or in contact with the soil. A 6-inch distance between the bud line and the soil would usually provide an effective barrier to infection; but a 12-inch distance would be better, provided this does not interfere with mounding.

Foot rot is widely recognized as a disease of older trees, yet there is no indication that susceptibility increases with the age of the tree. The main difference between a young tree and an old one is in the habit of growth. An old tree provides dense shade which prevents the soil about the root crown from reaching temperatures lethal to the fungus. In addition, the side branches usually drag on the ground and they in turn are often surrounded by a high wall of weeds or other cover. Frequently dead branches and prunings are piled about the trunk where they may become covered with vines. All these conditions which help to maintain a stagnant, saturated air mass in contact with the soil surface, and effectively retard evaporation and provide an ideal envoirnment for the growth of the foot rot fungus. It is small wonder that foot rot is a problem. The surprising thing is that it is not more prevalent. The obvious remedy is to correct those conditions that favor its growth. In brief, the following practices should be undertaken more or less rigorously according to the age and susceptibility of the trees and the prevalence of foot rot in the district:

A. In old grove:

1. Judicious pruning to raise the skirts to 18 or 24 inches.

2. Clean cultivation under the tree umbrella.

3. Remove the dead bark of old lesions.

4. Annually, before the spring rains, spray the root crown and trunk of all trees to a height of 18 inches with:

a. 1-12½ lime sulfur, or

b. 30-20-100 Bordeaux.

B. In young grove:

1. Clean cultivation under the tree umbrella.

2. Annually, before the spring rains, spray the root crown and trunk of all trees to a height of 18 inches with:

a. 1-12½ lime sulfur, or

b. 30-20-100 Bordeaux.

C. In new grove:

1. Resistant rootstock budded 6 or more inches above soil line.

Correcting the conditions which contribute to infection as indicated above plus a routine protective spray should virtually eliminate subsequent infection of all but extreme cases of susceptibility and adverse location.

Table 1. Relative susceptibility to **Phytophthora citrophthora** of 15 varieties of citrus that might be considered as rootstocks, as indicated by size of lesions 60 days after inoculation (4).

	Sq. cm.
Morton Citrange	24.5
Rusk Citrange	20.2
Navel (sweet orange)	14.6
Rough Lemon	10.6
Grapefruit (Duncan)	10.4
Pineapple (sweet orange)	9.1
Sour Orange (So. Africa)	8.0
Sweet Lemon (lime)	7.6
Sour Orange (Florida)	7.0
Valencia (sweet orange)	6.9
Jaffa (sweet orange)	4.5
Cleopatra (mandarin)	4.5
Sour Orange (seedling)	3.1
Golden Buckeye Navel (sweet orange)	1.0

Table 2. Relative susceptibility to **Phytophthora citrophthora** of 15 citrus varieties commonly used as scions, as indicated by size of lesions 60 days after inoculation (4).

	Sq. cm.
Lemon—Ponderosa	16.3
Lemon—Villafranca	45.3
Lime—Bearss	1.0
Lime—Tahiti	10.8
Grapefruit—Marsh	9.6
Grapefruit—Pernambuco	14.5
Grapefruit—Royal	29.9
Sweet Orange—Indian River	3.6
Sweet Orange—Parson Brown	8.3
Sweet Orange—Ruby Blood	10.0
Sweet Orange—Mediterranean Sweet	16.5
Mandarin—Satsuma	2.5
Mandarin—Oneco	5.9
Mandarin—King	10.5
Mandarin—Dancy (tangerine)	13.6

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SOME OBSERVATIONS OF THE CONTROL OF CITRUS PESTS BY TREE SNAILS IN LAKE COUNTY

(Continued from page 3)

grove operated by Mr. R. Parks Williams between Fruitland Park and Lady Lake, north of Leesburg, and most of our comments will be the result of observations in that grove during the past five years.

The grove is located on Norfolk fine sand and is underlain with clay at from 18 inches to five feet. The topography is rolling. There are about 17 acres in the grove, the rootstock is sour orange, trees are about 25 years old and sufficiently large to provide considerable shade in the grove. The varieties are primarily March Seedless grapefruit and Valencia orange. While the soil in the grove is good, due to the proximity of clay to the surface, the soil cannot be classified as better than varying from high hammock to high pine land soil.

The cover crop consists of Bermuda grass, sandspur grass, Florida clover (a non-legume), poke weed, lamb's quarter, poisonous nightshade and Spanish needles. The cover crop in the grove is encouraged to make all the growth possible during the summer months because it is believed that the high humidity induced by rank vegetative growth together with the contribution to this humidity condition by the trees themselves has a definite relation to the snail population in the grove. The grove soil is plowed each fall and this, as you know, does not discourage Bermuda grass.

The grove has received no copper or oil sprays in more than a decade. Sulfur dust is used to control rust mites. The lack of copper sprays induces fungous growth and the grove contains relatively large amounts of lichens and felty fungous. Although it would be natural to expect melanose infection to be severe through the grove, this is not the case. While melanose has been observed every year in the grove, it has never been sufficiently severe to cause the operator, who is also a shipper, to want to modify his program to include a program for melanose control and thereby eliminate the snails. We have no evidence that the snails consume melanose spores, but nevertheless melanose infection is not a serious condition in the grove in any year. Visitors frequently remark on this situation and if you visit the grove now you will find very little melanose outside of the two lower rows which received injury in the February 1947 cold.

As previously mentioned, humidity is believed to be a factor of prime importance to the effectivness of snail population. As a matter of fact, snails work only when the surface over which they travel is moist from rain or dew. Activity on the outside surface of the trees ceases by 9 o'clock in the morning on the southeast side of the tree. As the tree dries out activity stops entirely except on the under surface of leaves or twigs where the moisture remains. The snails pull themselves into their shells during these periods of adversity, but as soon as nightfall arrives with its accompanying moisture, or as soon as a shower occurs activity commences and the snails are out. As they move over the surface of the fruit, leaf or twig, their bodies emit a liquid which when it dries, leaves the area covered in a highly glossy state and apparently untenable for scale insects to attach themselves. The snails apparently consume white-fly honey dew which is responsible for the lack of sooty mold in these trees, but it is doubtful that they actually consume scale insects. In making checks of the relative humidity in the grove, we found at 9 a. m. on July 17 following a period of daily rains, that the humidity in the trees about six feet from the ground was 92 percent and in the cover crop in the middles it was about 90 percent. On August 5 we repeated these humidity checks at a time when rainfall had been scant for a week. On that day at 9 a. m. we had a relative humidity of 84 percent in the trees, 72 over the cover crop in the middles and 60 percent 50 yards outside the grove, in the shade over pine needles. Thus the influence of vegetation on the humidity can be readily noted.

It is interesting to note that elevation is not a factor in this grove as regards snail population, but humidity appears definitely to be a factor. The border rows throughout the grove have a relatively high scale population and practically no snails.

Temperature is another importsnt factor in snail activity and snail populations. Activity is definitely retarded during the winter and following a severe cold activity will cease entirely. It is during the winter cold and springtime dry periods that the snail populations suffer and scale insects make definite inroads. If the spring is extremely dry scale does considerable damage before the snail population can catch up with it. Last winter the snails were active right up until the February cold. That cold snap killed a large portion of the population of snails, but relatively moist weather followed in that area so that a prolonged drought did not further reduce the population.

We have conducted several tests in an attempt to find a practicable way to help the snails through the winter. When DeBusk made his studies of snails in Lake County he observed the snails wintered in coke pots set in the grove for firing. We have placed paper and cloth fertilizer sacks in the crotch of trees and protected many hundreds per tree in this way. When weather conditions become untenable for the snails either because of dry weather or cold weather they seek shelter. If they find it, many of them are carried over and if they do not most of them die before weather conditions are again favorable. When they get ready to hibernate the snails seal themselves into their shells. If the seal is broken they die for it is this seal that provides their first meal when they begin to function following the arrival of suitable weather conditions.

We know very little about the life history of these snails, Apparently there is but one main hatch during the year, although variations in the measurements of specimens found on trees indicates that perhaps a few snails are hatched whenever moisture conditions are favorable. This year the great mass of eggs were found between July 10 and 20. The eggs measure about .20 cm. in diameter and are deposited at the base of the tree under decaying organic matter. Moisture is a requisite to finding these eggs masses. We have never observed them under dry conditions, In the middle of July we found egg masses under every tree that we inspected in the grove. The young snails are about .15 cm. in shell length when they are hatched. While we were inspecting the egg masses a summer shower came up and thoroughly wet the trees. Upon returning to our station under the tree after the rain we found hundreds of these small snails which we had not previously seen beginning their migration up the trunks of the trees. This migration con-

tinued until the tree trunks were dry. We again visited the grove on August 5 and found these snails had increased in size between July 17 and that date to .45 cm. or a growth of 300 percent in the length of their shells. We observed snails of five different sizes varying from .15 cm. to 2.5 cm. in shell length. The two principal sizes we measured were those at .15 cm. and 2.1 cm. On our August 5 visit to the grove (which followed a period of several days without rain) we did not find a single egg and the organic matter under the trees was dry. The population of snails in the trees had steadily increased, but for some reason there appear to be fewer snails in the grove this year than last.

Previous experience indicates that by the late October and November the snail population in the grove will be at its maximum. It is at that time that some form of protection should be provided for their protection during cold weather. Undoubtedly a method of maintaining a high humidity in the area in which the snails were being protected together with some form of suitable food would do much to activate the snails early enough in the season to better keep early scale infestations under control.

We have not observed that snails have any effect on rust mite infestations. Groves in which snails are found are generally dusted to control mites whenever the need requires. On hot days sulfur dust kills a few snails.

Zinc sulphate applied with sulfur in spray form does not harm snails. In a grove at Yalaha which became badly frenched due to high water two years ago, half the grove was sprayed with sulfur and zinc and the other half, because of the fears of the grower that sinc would kill his snails, was sprayed with sulfur only. There was no indication that the zinc harmed the snails.

Snails can be transplanted most successfully, so far as we know, during the rainy season. Any effort to grow snails in young groves, in groves where the cover crop is not abundant or under any condition of low relative humidity would doubtless end in failure.

While there remains much to be learned about these tree snails in so far as they relate to citrus pest control, and assuming that in most groves they would never establish themselves anyhow, it appears that there is sufficient evidence of the value in some areas to warrant a full study of their habits, requirements and benefits to growers.

Almost two-thirds of the farm houses in the Unite dStates would have to be either enlarged, repaired or replaced before all farm families could have the kind of housing that middle-income city people take for granted.

The Florida Citrus Industry

By BROWN R. RAWLINGS
In Monthly Review, Federal Reserve Bank of Atlanta

(Concluded from last issue)

A regulation of the total volume marketed has, however, some far-reaching implications. A partial diversion of the crop to noncompetitive uses or the actual destruction of part of it is required. Apparently however, the growers and the general public have an aversion to such measures. If total volume is limited to the extent that prices are kept relatively high, the long-run consequence may be an undesirably expanded production. Marketing controls that raise the retail price of the product above prices of its substitute products may result in a loss of markets. If the prices of Florida citrus fruit were to be maintained much higher than the prices of citrus products grown in other areas, for example, the Florida citrus industry might lose a large share of its market outlet. All the probable effects of marketing controls that limit total shipments are not clear, but apparently this type of control should be an emergency measure rather than a permanent price-raising procedure. Such a control method can be very beneficial to growers if it applied only in those seasons when crop sizes are abnormally large and demand conditions are extremely poor and if the quantity withheld from the market is no larger than the amount of the surplus.

Application of any of the commonly used marketing-control methods to the Florida citrus industry must involve overcoming some formidable obstacles. Whether such marketing controls should be applied to Florida problems depends on the practicability of their application as much as it does on the inherent qualities of the measures.

Seemingly voluntary programs of marketing controls are ineffective except for short periods. Such programs that include a majority of the growers may work well for a time, but the refusal of the minority group to participate breaks the whole program. Naturally the nonparticipants profit most from voluntary supply controls, since they receive the higher price brought about by reduced supplies but market their full volume of fruit. This weakness can be remedied by a program that legally compels all growers to abide by it. The Federal marketing agreements exemplify this type of program. Since limitations of market supply usually involve the public interest, the Government in the case of these agreements retains certain powers to insure that growers will use the controls in a manner consistent with the welfare of consumers. Therefore considerable Government intervention becomes necessary. The objection on the part of some segments of the industry to Government intervention is an important obstacle to the adoption of controlled marketing in Florida.

Each month the Federal Reserve Bank of Atlanta issues a review in which some major industry of the region served by the bank is featured. In the April issue of the Review, the Florida Citrus Industry was the subject covered. The material in this review is so timely and the conclusions drawn are so clear-cut that we believe their reproduction here will prove of great interest and value to the citrus growers of Florida.—Editor.

The fairly intense individualism of the Florida growers and the extreme variations from year to year in profitableness are closely related factors that also affect the feasibility of marketing controls. Florida citrus growing has, at times, been extremely profitable. During such periods the growers rapidly lose interest in controls. During the war period, for instance, demand conditions enabled the growers to sell large quantities of fruit regardless of quality. Their immediate reaction was to press for a relaxation of the grade and size regulations. The possibilities of extremely high returns have also tended to foster independent operation rather than industry-wide cooperation. Over the long run cooperatives may increase total grower returns, but the independent operator is in a position to gain most during periods of favorable prices.

In the past, effective marketing-control programs have operated best when there was a dominant cooperative marketing association of growers. The necessity of working together and the experience gained in cooperative marketing seem to facilitate the operation of marketing-control programs. Although coopera

TABLE OF PRODUCTION, NET RETURNS, AND PRICES OF FLORIDA CITRUS FRUIT AND INDEX OF NONAGRICULTURAL INCOME

Crop Year	Total Production Utilized (Millions of Boxes)	Estimated Net Returns to Growers (Before deductions for taxes, depreciation, and interest on investment) Total (Millions of Dollars)	Per Box (Dollars)	Equivalent Packinghouse Door Price Per Box for All Methods of Sale (Dollars)	Index of Nonagricultural Income (1935-39 100)
1927-28	16.0	27.0	1.68	2.63	116.3
1928-29	28.0	5.7	.20	.97	120.6
1929-30	17.2	18.3	1.06	1.86	117.8
1930-31	35.0	10.0	.29	.92	103.2
1931-32	24.4	10.9	.45	1.14	82.8
1932-33	28.4	0.6	.02	.64	69.7
1933-34	29.3	10.0	.34	.92	78.4
1934-35	32.8	8.9	.27	.74	84.7
1935-36	29.5	20.2	.69	1.14	96.3
1936-37	40.6	24.6	.61	1.05	106.3
1937-38	40.9	9.0	.22	.77	100.6
1938-39	56.4	3.4	.07	.53	103.2
1939-40	43.0	5.0	.12	.65	110.8
1940-41	59.9	8.8	.6	.72	126.9
1941-42	48.4	27.6	.57	1.14	154.7
1942-43	69.7	76.3	1.11	1.62	195.2
1943-44	60.8	94.0	1.16	1.89	224.8
1944-45	69.0	111.9	1.62	2.33	237.1
1945-46	86.0	125.6	1.46	2.25	231.0

tive marketing holds an important place in the Florida citrus industry the scene is still dominated by the independent grower, shipper and processor.

Administrative difficulties crop up in any marketing-control program. The nature of the Florida citrus industry would tend intensify them and to increase them. A special problem is presented by the large number of selling agencies which handle small quantities of fruit. Sometimes marketing quotas of the individual selling agencies, for example, are set at a percentage of the volume of fruit handled in the past. Such a system might easily drive some of the agencies that ordinarily handle only a small volume of fruit out of business because, under it, their quotas might be too small for economical operation. Furthermore, in Florida many varieties of citrus are grown under a wide range of conditions. The resulting lack of standardization of the product would add to administrative problems.

An effective marketing control would have to include processed products as well as fresh fruit. Despite the efficiency of fresh-fruit marketing controls, the effects that the large volume of processed citrus fruit would have on fresh-fruit prices could offset any benefits from the regulation of only fresh-fruit supplies. For one thing, of course, it would be necessary to determine what proportions of the total crop should be marketed as fresh fruit and as processed fruit in order to maximize returns to growers and processors. There are some conflicts of interest between growers and processors, but there are also common interests that have been inadequately explored. There is no doubt that a great deal more cooperation between the two groups than has been exhibited in the past would be necessary.

For overcoming the problems of the Florida citrus industry there are, as with most economic problems, several alternative methods. Some of the most promising are measures designed to expand the outlets and increase the use of citrus. Though the export market presents some possibilities, it is likely that at best only a very small proportion of the total crop can be exported. Apparently an increased emphasis on processing offers the greatest opportunities for more domestic consumption. Since there are some indications that per capita consumption of fresh citrus fruit is nearing its limits, the processing outlets must be expanded still further if the prospective production is to be marketed at satisfactory prices.

In the 1945-46 season about 70 per cent of the grapefruit crop and about 40 per cent of the orange crop were processed. Canned grapefruit segments and single-strength juices comprised the bulk of the processed. During the war period concentrated juice production expanded rapidly and now constitutes one of the promising new outlets for citrus. The newest processed citrus products are the frozen concentrates.

By making lower retail prices possible the development of by-products from processing wastes can expand the consumption of citrus. None of the by-products developed so far is a major profit item, but they all have been helpful in reducing processing costs on the major-profit

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(Continued from page 9)

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THE FLORIDA CITRUS INDUSTRY

(Continued from page 13)

items. Chief of those produced in Florida are stock feed, citrus molasses, peel oil, pectin and alcohol.

Pectin and citrus-pulp cattle feed appear to be the most promising. The expansion of the Florida cattle industry coupled with the deficiency of carbohydrate feeds in the Southeast will create an expanding market for citrus cattle feeds. Dry-pulp feeds, which compete favorably with beet pulp, have given satisfactory results in feeding trials and in actual farm practice. Before the war cattle feed from citrus pulp and peel was produced for about $16 a ton and sold for around $22. Pectin, which is also made from the peel, is used largely in the preparation of jams and jellies. Although only small quantities of it are produced in Florida at present, greatly expanded uses for it are indicated in recent technological developments.

In addition to increasing consumption by lowering the price of established products, processing developments, particularly the concentration of citrus juice by freezing, may open entirely new outlets. From the standpoint of consumer acceptance one disadvantage of processed citrus products has been the inability to produce a preserved juice that has the taste, appearance, and nutritional qualities of freshly extracted juice. Heat, which is used in most citrus processing, causes citrus juices to lose more flavor and nutritive value than it does most other fruit juices. The flavors of fresh citrus fruit come largely from organic bodies that that are partially lost when the juice is heated. Since the cold concentrate process involves no use of heat, it avoids undesirable changes in flavor and nutritive qualities.

Although the method is not new its application to Florida citrus processing is of very recent origin. This application is based primarily on the research of A. L. Stahl and his associates of the Florida Agricultural Experiment Station at Gainesville. In a pilot plant financed by the Florida Citrus Commission the process was tested extensively and is already being used in some commercial plants, with others planning to install necessary equipment soon.

It has numerous advantages that may have significant effects on the future of citrus processing and distribution. In addition to a flavor, a color, and nutritional values superior to those of juice concentrated by other means, there are advantages such as a reduction in bulk, the absence of refuse, very small losses in manufacturing, and an ease of restoration. The finished product is concentrated at a three-to-one ratio, which means that it is restored to single-strength juice by the addition of three parts of water to one part of the concentrate. At 0° F. the concentrate has the consistency of ice cream.

Because it is adapted to all types and varieties of citrus fruit, the method may solve the marketing problem presented by certain varieties of Florida oranges in the past. Apparently early Florida oranges, both in fresh and the usual processed forms, owe their relatively poor consumer acceptance largely to their low solids content. By concentration the solids content of their juice is raised to the most desirable point, thus enhancing the acceptability of the product.

The frozen concentrate promises to be an important factor in the soft-drink outlet that the Florida industry is trying to develop. It now seems probable that, with the proper promotion and the processing of a high quality product, Florida citrus juices can be made to compete favorably with other soft drinks. Frozen concentrate is admirably adapted for this purpose. At 15° F. the three-to-one ratio concentrate is a liquid. A measured amount of it can be squirted into a glass of appropriate size and tap water added to produce a drink that has the flavor and other qualities of fresh juice .

One of the difficulties in processing high quality juice by any method is keeping the amount of peel oil at a minimum. Even small quantities of the oil may impart an objectionable taste to citrus juice. particularly if the juice is stored for a considerable period of time. When processing methods involving heat are used a large proportion of the peel oil is removed by distillation. If a high quality product is to be obtained with processing methods that involve no use of heat, it is imperative that no peel oil get into the juice at the time of extraction. Improvements in juice extraction machinery are needed, therefore, if the cold concentrate method is to achieve maximum success.

Prospects

Primarily the future of the Florida citrus industry depends on its selling the expected large volume of citrus fruit at reasonably profitably prices. This problem has been encountered frequently in the past, with each crisis being followed by a period of prosperity and expansion. The nature of the problem, however, has changed significantly. From a relatively simple agricultural enterprise that produced a small number of products the Florida industry has grown into a highly integrated business that produces a wide variety of products. This change has greatly complicated what was once a fairly simple economic problem. It is clear, therefore, that the simple panaceas which are advocated so

frequently would be ineffective. The establishment of marketing controls and the expansion of markets are the general types of activities most likely to accomplish the desired objectives. In an evaluation of what may be accomplished by either method it is important that both the method's limitations and its possibilities be carefully considered.

Marketing agreements may improve net returns by minimizing the unfavorable effects of disorderly marketing during a particular season or by preventing depressing effect of unusually large annual surpluses on prices. Such agreements are inapplicable, however, to the disposal of a total supply that is too large to be sold over a long period at profitable prices. In other words, marketing agreements cannot be used to control production.

By increasing the total quantity that can be profitably sold, market expansion also may improve net returns but will not prevent the unfavorable effect of disorderly marketing or unsually large annual surpluses. Because of the difficulties of applying marketing controls to the Florida industry it appears unlikely that this method can accomplish much in the near future.

Though the marketing agreement now in effect with respect to grade and size regulations provides a valuable tool, it cannot solve the overall problem. A series of unprofitable seasons might result in the adoption of a comprehensive marketing control scheme in spite of the difficulties, but at present the best approach seems to be in the general field of market expansion. Progress in processing, such as the conversion of wastes into by-products and the development of new products and retail outlets, holds greater promise for the future of the Florida citrus industry. The successful development of new outlets depends primarily on industry-wide cooperation. If all segments will recognize the principle that their common interests are far greater than their conflicts of interest and follow that policy the industry can look forward to a prosperous future.

Hardee County home-makers have been busy canning peas, corn, okra, cucumbers and chickens during the past few weeks, according to Miss Mildred J. Taylor, home demonstration agent, reports.

Citrus Industry To Have Aid of Bankers

The citrus industry has been offered every possible assistance by bankers of the state. This offer of assistance was made known by A. A. McKethan, President of the Florida Bankers Association, as a result of a recent meeting of the Association's Citrus Committee.

The Citrus Committee, the Chairman of which is T. G. Mixon, President First National Bank, St. Petersburg, has drawn a Statement of Policy which will be the basis of the new program of cooperation and assistance to citrus in all its various phases. That Statement, which has been addressed to the several citrus trade bodies, reads as follows:

"The Florida Bankers Association through its Citrus Committee, recognizes that the citrus industry is foremost in the economy of the state. It is further recognized that there is an ever increasing supply of citrus because of which fact the citrus industry is faced with serious problems in marketing and distribution. The Florida Bankers Association therefore is vitally interested in and is anxious to cooperate with the citrus industry in improving these conditions.

It has been observed with interest and gratification the thought, study and intelligence which are being given to the solution of these problems by the Florida Citrus Commission and citrus trade bodies especially as related to the movement of immature fruit and further improvement of the standardization of quality both in fresh and processed fruit.

It is believed the solution of these problems requires the unselfish cooperation of all parties interested in the citrus industry. The marketing of the increased production lies in a wider distribution and more favorable acceptance by the ultimate consumer. It is felt that increased thought, study and research should be given to production of better quality fruit, perfection of processing and merchandising methods and development of new consumer products.

Because of its sustained interest in the development of the citrus industry, the Florida Bankers Association reaffirms its desire and willingness to render every possible assistance to growers, processors, and distributors, and their affiliated organizations."

The LYONIZER

Department

COMPILED BY THE LYONS FERTILIZER CO.

Reports Of Our Field Men . . .

WEST CENTRAL FLORIDA
E. A. (Mac) McCartney

The continuous rains have been fine for citrus groves throughout this territory. Our trees are in excellent condition, the cover crops are good and the fruit is sizing up in fine shape. While the rains have been beneficial to the citrus grower, their continuance is not just what the vegetable growers would like to have at this time. However, if we should have seasonable weather beginning at an early date most vegetable growers will get their crops under way at a reasonable date. Growers have been successful in getting their scale insects under control and we are now keeping a close check on rust mite to see that no damage is caused by these pests. While our crop is probably not the heaviest ever produced in this territory we do have a good average crop, and I am glad to report that it is of excellent quality. There is little activity being shown by fruit buyers but we have seen several of them in the territory looking for early oranges and tangerines. However there have been very few growers showing any inclination to sell at this early date.

SOUTH POLK AND HIGHLANDS COUNTIES
R. L. (Bob) Padgett

We reported several months ago that our fruit crop would be considerably curtailed this coming season as a result of the February freeze. We haven't changed our mind about the size of the crop. There are many groves that were defoliated by the cold weather that does not have any crop at all, while others that were not damaged as severely, that have only a small percentage of a normal crop. It is interesting to note, however, just how rapidly these damaged trees have recovered. They have put on a nice growth and will be in condition to put on a crop of fruit next spring. Rains have been plentiful this summer and cover crops have made an excellent growth. Most groves will have two complete crops of organic matter chopped into the soil. Rust mites are now very active and with weather conditions as they are growers are having a difficult time in keeping these pests under control.

NORTH CENTRAL FLORIDA
V. E. (Val) Bourland

During the early summer we had very little trouble with rust mite, but during recent weeks we have had quite heavy infestations and growers have been very busy keeping these pests under control. With continuous rains this has been difficult but with continuous effort the job has been accomplished. We still maintain that our orange crops will be somewhat lighter this season than last, and this is also true with tangerines, but we have a good crop of grapefruit. The quality is very good, and with favorable weather conditions this fall we should be able to supply the market with the kind of fruit that will create a very excellent market. We have been asked on many occasions about the prospect for prices, and so far have not been able to answer. To date there has been very little activity shown by the buyers, but the packing house people that we have talked to seem to be optimistic about fair prices during the season.

HILLSBOROUGH AND PINELLAS COUNTIES
C. S. (Charlie) Little

We have reported before that this territory has been a favorite area for scale insects. This summer has been no exception and in many instances it has been necessary to apply two applications of oil to properly control scale. Rust mite have also been active and growers have been busy with their spray and dusting machines. Our fruit crop is showing up well and every indication at this time is that we will have some real quality fruit. While a large number of growers failed to show very much of a profit last season most of them are looking forward to the coming 12 months with a great deal of optimism. As a general rule at this time of the year we generally contact a number of fruit buyers throughout the territory, but this summer we haven't seen very many circulating around, and those that are covering the territory are more or less spotting certain crops for future consideration.

POLK COUNTY
J. M. (Jim) Sample

Grove owners have been busy during the past few weeks getting their cover crops chopped and using every means possible to keep rust mite under control. With rains putting in an appearance every day it has been extremely difficult to spray or dust in such a manner that mites would be adequately controlled. Cover crops have been very prolific and after cutting them they are growing off well for a second growth. There is very little activity being shown by fruit buyers in this county. We have heard of several offers being made for early oranges and tangerines, but no sales have been made. In spite of the extremely heavy rains that we have had this summer groves are holding up well and the fruit is maturing into excellent sizes. It now appears that we will have very few packing houses in operation before some time in October.

SOUTHWEST FLORIDA
Eaves Allison

At the present writing the biggest subject of conversation in this territory is the excessive amounts of rain we are having and the long continuance of the rainy season. So far most groves are not showing any serious ill effects, but in many locations the ground is soggy and some land inundated. Should the condition continue much longer there will be no doubt there'll be some damage to trees as well as to the present crop of fruit. Vegetable and bulb growers are having a hard time finding a chance between rains to prepare their land for fall plantings. However, if the rains let up pretty soon they will be able to get off to a good start anyway. Most citrus and vegetable growers are looking forward to a good fall season. Cover crops have been very good this season and they are now being chopped.

ADVERTISEMENT—LYONS FERTILIZER COMPANY

Seems that a lot of growers is gettin' sort of fretted 'cause buyers ain't around tryin' to buy up all next season's crop along about now . . . so far as we are concerned it'd be a most unusual thing if they was after the lickin' a lot of 'em took last season . . . on the other hand we ain't a bit disturbed over the situation, 'cause we know that the packin' houses are goin' to operate this comin' season just like they have all these years past . . . and that if the growers will continue on with the job of producin' quality fruit like they have started there'll be plenty of chance of sellin' your crop this year at good prices.

Shore have had plenty of rain this season . . . in fact we've had so much that in a lot of places leachin' is takin' the plant foods out of the soil at a rapid rate . . . groves as a rule has held up mighty well all durin' the season but it won't be surprisinn' to see some of 'em gettin' hungry 'fore long . . . with a fine quality crop in most places it'll pay every grower to watch his trees close and when they show signs of bein' hungry see that they git their fall fertilizer application without delay . . . every grower knows that fruit that is stunted from hunger never develops into good sized quality fruit . . . your fertilizer field men will be more'n glad to work with you on this problem.

H. G. Clayton, Florida's new extension director, is a strong booster for the livestock possibilities of Florida . . . he said recently that Florida farmers have built from 600,000 to 800,000 acres of improved pasture and that this is more improved pasture than in all the rest of the Southeastern states.

Research workers is tryin' all the time to improve pasture grasses, with the result that Florida's cattle will soon be at the top of the heap in producin' high grade live stock.

Food production has jumped almost out of sight all over the country . . . fer instance canned grapefruit has jumped from 21 million cases in 1938 to 77 million cases in 1946 . . . canned vegetables has gone from 132 million cases to 230 million cases . . . frozen fruits has gone from 152 million pounds to 523 million pounds; frozen vegetables from 85 million pounds to 450 million pounds . . . since less of these products are going abroad and a greater supply to the American housewife the days of "grabbin' what you kin git" are over . . . from now on Quality is goin' to be the biggest factor in sellin' farm products . . . and since that is the case we're tickled pink to see the growers of the state doin' their best to produce Quality Crops of every sort.

Uncle Bill

Orange Jelly Will Soon Be Available

A citrus item which was greatly relished by American soldiers in German prison camps, concentrated orange jelly, will become available to the nation's food trade within the next few weeks.

B. C. Skinner, president of Juice Industries, Inc., one of the pioneers in the field of canning and concentrating citrus juices, annuonced that the orange concentrate jelly, first manufactured three years ago for Red Cross use in prisoner of war packages, now is being put up in 12-ounce reusable glass tumblers for the civilian food trade. First deliveries are scheduled to be made next month.

The tasty product not only has a distinctive orange flavor and high vitamin C content, but also is the golden yellow of pure orange juice, he pointed out.

Operating in a government-constructed plant in Dunedin, Juice industries, Inc., then known as Citrus Concentrates, Inc., supplied great quantities of concentrated orange juice for lend-lease, the armed forces and the International Red Cross during the war.

The jelly is just one of a number of citrus products processed in the new Dunedin plant, which was rebuilt the past season after being destroyed by fire near the end of the war.

Dangerous Insect From Far East Halted At Pacific Port Of Entry

The mango fruitfly, a native of the Far East, which during the war made its way to Hawaii to become a serious fruit and vegetable pest, almost slipped into continential United States recently. A plant quarantine inspector of the California State Department of Agriculture, serving as a collaborator of the Bureau of Entomology and Plant Quarantine of the U. S. Department of Agriculture, found 42 live maggots in overripe bananas in a passenger's baggage on a boat from Hawaii docking at San Pedro, Calif. He immediately destroyed them, preserving a few specimens which later were identified as the mango fruitfly (Dacus dorsalis) in its immature stage.

This was the first time this foreign insect pest had been turned back from our shores. During the first six months of 1947, Federal Plant Quarantine inspectors intercepted its larvae in avocadoes, guavas, (Spondias dulcis) (a relative of the mango,) and Kamani nuts in parcel post packages mailed from Honolulu to various points in the mainland.

IMPORTATION OF FOREIGN AND HAWAIIAN-GROWN CIT-CITRUS NURSERY STOCK IS NOW PROHIBITED

(Continued from page 7)

cation of the disease in all states with the possible exception of limited parts of Taxes and Lauisiana. where there is a possibility that the disease may persist in some areas remote from commercial citrus plantings. The disease has not been dected in any commercial planting of citrus in this country for many years.

NEW SUPERVISORS

Three supervisors of the Volusia Soil Conservation District were recently elected by popular ballot, according to County Agent W. J. Platt, Jr. They are Leo Fugle, Ben J. Nordman and H. C. Allan.

Florida farmers who strike efficient management blows now will be in a better position if deflation strikes later.

CANNED GUAVAS

By Isabelle S. Thursby
Extension Food Economist

Guava Sauce

Take ripe, well-flavored, acid guavas. Wash fruit and remove blossom and stem ends and any blemishes on skin. Run through fruit press to remove seed. Measure. Cook in heavy aluminum kettle until somewhat thickened. Add two or more cups of sugar (according to acidity of fruit) to four cups of pulp and cook rapidly again for about 15 minutes, stirring often. Pour into hot jars, put immediately into boiling water, and process five minutes. This is excellent for pudding sauces, shortcakes, cobblers, gelatin desserts, or for use in making guava ice cream.

LIME TO PASTURES

Ten Duval County farmers applied a total of eight carloads of lime to their pastures during the past month, according to County Agent A. S. Lawton.

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